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**EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE
TRANSBOUNDARY AIR POLLUTION**

Steering Body to the Cooperative Programme for Monitoring and Evaluation
of the Long-range Transmission of Air Pollutants in Europe (EMEP)

Thirty-second session
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Item 6 of the provisional agenda

EMEP STRATEGY FOR 2010-2019

REVISING THE EMEP STRATEGY

Note by the Bureau of the Steering Body of EMEP

1. The current strategy for EMEP (ECE/EB.AIR/73)¹ is valid for the period 2000-2009 and is supported by the complementary EMEP monitoring strategy adopted for 2004-2009 (ECE/EB.AIR/83/Add.1, Decision 2004/1). Both strategies cover the same time span, with the next strategic period starting in 2010. Consequently, the Steering Body, at its thirty-first session, invited its Bureau to review the EMEP strategy with a view to identifying the needs for revising it and to report back at its thirty-second session (ECE/EB.AIR/GE.1/2007/2, para. 47(f)).

¹ http://www.unece.org/env/lrtap/emep/strategy_full.pdf

2. In reviewing the current strategy, the Bureau, in collaboration with the secretariat, proposes to initiate development of a new strategy for the next period of 2010-2019. The purpose of this note is to provide the basis for a discussion on the elements to be revised in the EMEP strategy and to lay the foundation for the preparation of a new strategic document that encompasses all elements in EMEP namely emissions, modelling, monitoring and overall assessments.

3. The present note aims to involve the Parties to the Convention through the EMEP Steering Body and its subsidiary bodies (Task Force on Measurements and Modelling, Task Force on Hemispheric Transport of Air Pollution, Task Force on Integrated Assessment Modelling, Task Force on Emission Inventories and Projections) as well as the EMEP centres (Chemical Coordinating Centre (CCC), Centre for Emission Inventories and Projections (CEIP), Centre for Integrated Assessment Modelling (CIAM), Meteorological Synthesizing Centre-East (MSC-E), Meteorological Synthesizing Centre-West (MSC-W)) in the development of the new EMEP strategy. The Bureau also proposes to invite inputs from the Working Group on Effects and the Working Group on Strategies and Review as well as from their relevant subsidiary bodies to ensure that the future longer-term strategies for the Convention are well coordinated. In this context, it should be noted that the Bureau of the Executive Body is also considering proposals for a strategic plan for the Convention and the development of the Strategy for EMEP might highlight issues to be considered on a Convention-wide basis.

4. The note lists possible elements and questions for discussion by the Steering Body at its twenty-third session. On the basis of the discussion, as well as from the inputs from the EMEP Task Forces, the EMEP centres and the other Convention bodies, a new EMEP strategy document for the period 2010-2019 will be drafted for consideration by the Steering Body at its thirty-third session in 2009. If adopted, it will be forwarded to the Executive Body for approval at its twenty-seventh session.

5. In addition to this note, an informal document on the achievements of the EMEP strategy for 2000-2009 has been prepared to support the discussion on the revision of the strategy and it will be made available for the thirty-second session of the Steering Body.

I. WHY A NEW EMEP STRATEGY?

6. The current strategy for EMEP 2000-2009 has succeeded in fulfilling its vision through:

(a) Scientific achievements aimed at underpinning, developing and evaluating environmental policies (Science);

- (b) Involving Parties to the Convention, which have become an important driving force for the EMEP Centres (Partnership);
- (c) Open use of intellectual resources and products (Openness);
- (d) Sharing of research work and information (Sharing);
- (e) Evolving organizational structure (Organization).

7. EMEP has developed a specific capacity to quantify the long-range-transport of air pollution including its source-receptor relationships and has developed a mature system for quality assurance of methods and results. The Convention is using science to support the identification and design of policy responses, through extended peer review of methods and technical results by scientists and relevant stakeholders.

8. The informal document on the achievements of the EMEP strategy for 2000-2009, which will be made available to the Steering Body for its thirty-second session, demonstrates that the objectives of the current strategy have mostly been achieved. However, the political issues and their driving forces, the science questions and our capability to address them, the global organization of environmental policies and their technical underpinning are all evolving. Consequently, the revised strategy will need to reflect these changes while retaining the vision for the EMEP programme, which is still at the core of the strategy and still considered to be valid.

II. POLITICAL ISSUES AND DRIVING FORCES

9. The political issues and driving forces have evolved since the year 2000, when the current strategy was adopted. The following paragraphs provide an overview of the main driving forces and political issues to be considered in the development of a new EMEP strategy. While the Convention remains the dominant driving force for EMEP activities - because EMEP's programme of work is determined through the Convention's workplan - it is important to recognize that there are many other driving forces that will influence both the work of the Convention and that of EMEP.

A. Current policy developments linked with the Convention

10. The current policy developments linked with the Convention that have an impact on EMEP relate to:

- (a) The Gothenburg Protocol, its status of implementation and need for revision;
- (b) Particulate matter (PM) and the related health effects as a dominating environmental policy concern;
- (c) Revision of the Protocol on Persistent Organic Pollutants (POPs), inclusion of new POPs into the Protocol (taking into account the European Commission's Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH) activities).

B. Related current policies

11. Related policy developments undertaken in other forums that influence EMEP, include:

- (a) The implementation and revision of the European Union (EU) Directive on National Emission Ceilings (NEC) and other EU legislation;
- (b) The new EU REACH Regulation that can be a new driving force for persistent toxic substances (PTS);
- (c) Growing activity under the UNEP Global Convention on POPs (involving more than 150 countries), and in particular the development of the UNEP Global POP Monitoring Programme (GMP);
- (d) UNEP Mercury Programme and UNEP lead and cadmium activities.

C. The EU Global Monitoring for Environment and Security (GMES)

12. The EU Global Monitoring for Environment and Security (GMES), its joint initiative with the European Space Agency (ESA): the Global Earth Observation System of Systems (GEOSS) and the GMES atmospheric services (GAS) plan to deliver standard European data, on which downstream services will be based. Information is to be provided for process assessments; day-by-day analysis of the atmosphere at various space/time scales; key information on long-range transport of atmospheric pollutants; European overviews and initial and boundary conditions for air quality models; sustained monitoring of greenhouse gases, aerosols and reactive gases such as tropospheric ozone. The primary themes are Climate Forcing; Air Quality; Stratospheric Ozone and Solar Radiation.

D. The common agricultural policy (CAP)

13. The common agricultural policy in Europe is due for revision over the next five years with implications both for the European nitrogen cycle and land use pattern.

E. Globalization

14. The driving forces for the EMEP activities related to globalization include:

(a) Globalization of European air pollution, involving: (i) emission growth in the Far East; (ii) globalization of the economy and its consequences for intercontinental transport of air pollution; (iii) aircraft emissions (International Civil Aviation Organization(ICAO)); (iv) shipping emissions (International Maritime Organization (IMO)); (v) changes in biomass burning and forest fire frequency and extent;

(b) Increasing geographical coverage of the Convention following the accessions of Kazakhstan and Kyrgyzstan to the Convention in 2000 and 2001 respectively, and with the interest shown by other former Soviet republics in Central Asia as well as in Eastern-Europe and Caucasus to accede to the Convention or to its protocols. Currently, there are 51 Parties to the Convention, including the European Community, out of which 23 have ratified the Gothenburg Protocol;

(c) Increasing emphasis on the intercontinental transport of air pollution and its contribution to the pollution levels in various regions (e.g. Europe, the Arctic, marginal seas);

(d) Need for openness to promote the participation of representatives of other regions (North America, Asia, Africa) in the activities of the Convention.

F. World Meteorological Organization

15. The World Meteorological Organization's new Global Atmosphere Watch (WMO/GAW) Strategy includes the International Global Atmospheric Chemistry Observations (IGACO) strategy and emphasizes near real time delivery of environmental data².

² For more information see <http://www.wmo.ch/pages/prog/arep/gaw/documents/gaw172-26sept07.pdf>.

G. Climate change and United Nations Framework Convention on Climate Change

16. Climate variability and change have consequences for atmospheric composition. The adaptation of societies to climate change also has consequences for atmospheric composition e.g. through changes in the emissions from energy consumption as the energy production system moves towards more extensive inclusion of renewable energies including biofuels.

H. Open data policy

17. The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (The Aarhus Convention, adopted in 1998) has noted: “In a democracy, the people have the right to gain access to information, including environmental information. The government has the responsibility of supporting the public interest by making it easy to access that information. To ensure that this fundamental democratic right is fully realized in practice, the Convention elaborates on the specific rights of individuals. Some key questions people ask about the right to know are: Anyone can ask for any environmental information possessed by any governmental agency or any private body that serves a public function. The person making the request does not have to be citizen or resident of that State and does not even have to provide an interest or a reason. NGOs can request information regardless of where they are legally registered.” Parties to the Convention may wish to take note of this.

18. The Directive on Infrastructure for Spatial Information in Europe (INSPIRE), launched by the European Commission is more specialized in scope than the Aarhus Convention, focusing on geographical map based information. It aims at making publicly available and free of charge, harmonized and good quality geographic information to support the development, implementation, monitoring and evaluation of European Community policies.

III. SCIENCE ISSUES IN THE REVISED STRATEGY

19. Significant progress has been achieved in scientific issues identified in the current EMEP strategy. In some cases, the ambition level of the current strategy has been surpassed by far, while in others, additional efforts will be necessary (see the informal document on the achievements of the EMEP Strategy). This section presents the first attempts to identify the main scientific issues to be included in the EMEP strategy for the next strategic period.

A. Transboundary air pollution: generic science goal of EMEP

20. The overall science goal of EMEP is related to transboundary air pollution and this should remain unchanged for the next strategic period. The main scientific issues are described in a rather generic manner in the current Strategy Plan. These scientific goals can be summarized as follows:

(a) Determine state and trends: (i) Determine the state of and the trends in deposition fluxes of substances contributing to acidification and eutrophication so that their effects can be assessed; (ii) Determine the exposure of man, crops, forests and other ecosystems to ozone; and (iii) Establish concentrations and population exposures of fine particulate matter; (iv) Determine the source-exposure relationships of heavy metals and POPs through a better understanding of exchange processes between atmosphere, soil, sea and biota;

(b) Determine and verify emissions and their trends: (i) Verify the reductions in sulphur and nitrogen emissions, and their effect on the deposition fluxes, particularly in relation to exceedances of critical loads; (ii) Verify emission reductions under the 1991 Protocol on Volatile Organic Compounds (VOCs) and the 1999 Gothenburg Protocol; (iii) Verify emission reductions of heavy metals and quantify national emissions; (iv) Minimize emission uncertainties for cadmium, lead and mercury, and in the longer term for copper, zinc, arsenic, chromium and nickel; (v) Verify the emission reductions of the same substances; and (vi) Quantify and minimize emission uncertainty, especially for pesticides;

(c) Calculate transboundary source-receptor relationships: (i) Calculate transboundary fluxes and provide source attribution of estimated or measured deposition fluxes in the form of contributions from emissions in one country to the deposition in a particular country or region; (ii) Attribute to sources the precursors contributing to ozone formation; (iii) Analyse trends; (iv) Assess transboundary fluxes, as well as the deposition and concentrations of selected POPs in the atmosphere, soil, sea and biota, to evaluate the harmful effects on ecosystems and human health; (v) Calculate transboundary fluxes of fine particulate matter and their source attribution; and (vi) Develop interfaces with urban modelling and assessment;

(d) Investigate ecosystem recovery: (i) Investigate, in cooperation with the Working Group on Effects, the recovery of ecosystems as acidification and eutrophication decline; (ii) Contribute to research on the effects of heavy metals on human health and the environment; (iii) Analyse how different environmental compartments respond to emission reductions of POPs; (iv) Quantify the decreased visibility caused by fine airborne particulate matter in Europe; (v) Contribute to the determination of the effects of fine particulate matter on radiation forcing and climate change in the EMEP region;

(e) Overall assessment: Investigate abatement strategies, including economic benefits from emission reductions through integrated assessment modelling. Economic development over the next 20 years will have an impact on the air quality in Europe as well as globally. The abatement actions among countries can assimilated only up to a certain limit. National differences need also to be accounted for;

21. Optimization is appropriate for assessing the broad strategies required to reach a specific target (e.g. for biomass usage or for shipping emissions). In optimizing abatement, options for reducing sulphur dioxide, nitrogen oxides, ammonia, VOCs, primary particulate matter and greenhouse gases/radiative forcing agents are taken into account. This includes structural measures in energy, transport and agriculture, and the calculation of their costs. The economic benefits of emission reductions are also calculated.

B. Air pollution changes as climate changes

22. Air quality development over the next decades (2010-2050) will be influenced by the coupling between climate variability/change and air quality/atmospheric composition and deposition. In this context, a regional focus is of special importance, for example, considering air pollution incidents in Eastern Mediterranean countries in summer 2007 and droughts in Mediterranean countries. Trends in the geographical distribution of the population must also be noted (e.g. the megacity evolvement in Greater London, the Low Countries, the Po Valley, Istanbul and Cairo).

23. Climate adaptation will have consequences for transboundary air pollution as the energy production system moves towards more extensive inclusion of renewable energies including biofuels.

24. There is transboundary transport of radiative forcing agents, such as aerosols and ozone, with significant regional gradients.

C. Air quality and its effect on the population

25. It is relevant to establish links between hemispheric, regional and local air pollution in order to determine the extent to which population exposure to air pollution is of transboundary origin as well as to identify sets of measures to control population exposure.

26. Information related to linkages of geographical scales (i.e. local and regional, intercontinental transport and global pollution) is to be further strengthened, especially with regard to the following main components:

(a) Particulate matter: The challenge is to characterize the physical and chemical composition of atmospheric particulate matter including the population exposure. The effects of exposure on human health must be assessed in consultation with WHO and other competent bodies;

(b) Toxic substances: (i) Identify new POPs and analyse their environmental cycles and impacts; and (ii) Describe the biogeochemical cycle of mercury in the environment and, in particular, its chemical transformations in the atmosphere, which remain poorly known.

D. Atmospheric physical and biological processes

27. Quantify fluxes of exchange between terrestrial ecosystems and the atmosphere, and between the oceans and the atmosphere (focus on fluxes rather than concentrations).

28. Quantify the interaction between the hydrological cycle and biogeochemical cycles.

E. Reactive nitrogen cycle

29. The atmospheric component of the biogeochemical cycle of reactive nitrogen, including its relation to the sequestration of carbon in ecosystems, is not well known. Reactive nitrogen cascades through environmental compartments with approximately 165 Mt N of reactive nitrogen produced each year, of which about 75% is related in some way to agriculture and 25% to the combustion of fossil fuels and the industrial use of nitrogen.

F. Air pollution and the carbon cycle

30. There are feedbacks between the biosphere and the atmosphere, for example the feedbacks between changes in carbon dioxide and ozone on biomass growth and emissions (VOCs, nitrogen oxides); and feedbacks between changes in temperature and precipitation on the one hand and changes in biomass growth and emissions of biogenic VOC and nitrogen oxides on the other. Understanding these processes will also be relevant to establishing how air pollution changes when the climate changes (see sub-chapter III.B).

G. Overall assessment and scenarios

31. Study co-benefits of simultaneous abatement of air pollution, climate and reactive nitrogen.

32. Optimization will become less meaningful and increasingly uncertain when emission reductions reach levels close to environmental targets or when most available measures are undertaken. Overall assessment can involve the testing of alternative measures to get an overview and can involve sensitivity studies or scenario analysis. Scenarios are established by using the best data available for projections of emissions, including the consequences of implementing current legislation and of the obligations under the United Nations Framework Convention on Climate Change (UNFCCC).

IV. ADDRESSING THE SCIENCE QUESTIONS

33. In addressing the scientific questions above, EMEP needs to fulfil its vision with respect to partnership, openness and sharing. This implies flagging capacity building as a core activity in EMEP. EMEP holds reference methods for how measurements are carried out, for quality control and quality assurance, emission inventories and projections, atmospheric (or earth system) numerical models and integrated assessment models.

34. For each of the science questions listed in chapter III, the EMEP strategy should identify:

- (a) Main policy questions to be addressed;
- (b) Main methods and capacity-building needs, covering at least the following four sub-items:
 - (i) Models, including process descriptions, relevant spatial and temporal scales:
 - a. Chemical transport models need to develop into Earth System Models (ESMs) to account properly for the coupling of dynamics, physics and chemistry; and the cycling of biogeochemical tracers between the soil, the atmosphere and the oceans;
 - b. Develop data assimilation techniques combining the use of remote-sensing observations (from satellites) and in-situ observations (“integrated monitoring”).
 - (ii) Emissions:
 - a. Including anthropogenic surface sources, biogenic sources including emissions from biomass burning and forest fires, aircraft (ICAO) and shipping (IMO) emissions;

- b. Need to improve the quantification of particulate matter emissions both in terms of size distribution and by chemical composition. Another example is that for heavy metals and POPs; the reporting of emissions and their associated certainty are insufficient.
 - (iii) Observations/monitoring:
 - a. Revise and update the EMEP monitoring strategy to reflect the evolving technological capabilities and to reflect the specific science questions to be addressed;
 - b. Keep up to date the quality control, quality assurance, reference methods;
 - c. Acquisition and processing of space and in-situ observations (near real-time (NRT) and historic and ancillary);
 - d. Further development of methodologies for monitoring POPs in air, precipitation, and other compartments, including congener composition of mixtures, gaseous and particulate phase of POPs, simultaneous measurements in different compartments, etc.
 - (iv) Overall assessment: including effects/impact, abatement options, costs and benefits.
- (c) Main functions and products required
 - (i) Open, transparent and free data policy, and efforts to close time gaps between reporting and the period being reported in line with the technological advances and user requirements (acquisition and processing of space and in-situ observations in near real-time (NRT) or in delayed mode where the delay is as brief as possible);
 - (ii) Updates with new information without undue delay.
- (d) Dissemination and outreach
 - (i) Identify links to users for each priority science area: national and international policy makers, other Conventions, research community and the public;

- (ii) Reduce the time gap between data collection and reporting to not more than six months in the case of data assessments and to near real time when online instrumentation is used alone or in conjunction with forecast models.

V. CHALLENGES RELATED TO PARTNERSHIP, OPENNESS, SHARING AND ORGANIZATION

35. It is a particular challenge for the new strategic period in EMEP to develop a common understanding of how the issues related to air pollution and its long-range transmission are of relevance to other initiatives, such as the Intergovernmental Panel on Climate Change (IPCC), GMES or the Stockholm Convention on POPs. It is important to show how the focus and the capacity built within EMEP can be beneficial in dealing with the political issues and driving forces listed in chapter II and the science issues in chapter III.

36. EMEP should liaise with the existing driving forces and develop joint work with the relevant initiatives to build a common understanding, an openness and a sharing of information and expertise. In particular, it should consider how best to:

- (a) Link to and contribute to GMES and GEOSS and their relevant projects;
- (b) Link to the climate change community (UNFCCC/IPCC) considering the 2010-2050 timeframe, which is not the focus of IPCC. Consider, through the Executive Body, an agreed sharing of tasks with IPCC/UNFCCC;
- (c) Link to UNEP Chemicals on the investigation of mercury, cadmium and lead atmospheric pollution;
- (d) Link to the Stockholm Convention and the European Chemicals Agency (ECHA) in the field of the evaluation of new POP;
- (e) Establish a formal link between the Convention and the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia and a working relationship between EMEP and the technical work under the Malé Declaration;
- (f) Develop further the link between the Acid Deposition Monitoring Network in East Asia (EANET), EMEP and the North American monitoring networks and evaluation and assessment activities;

(g) Further develop emission capacities through interaction with Global Emissions Inventory Activity (GEIA) (with the United States National Centre for Atmospheric Research (NCAR)) and the Emissions Database for Global Atmospheric Research (EDGAR) of the European Union's Joint Research Centre (JRC);

(h) Link to the ecosystem (terrestrial as well as marine) - atmosphere communities, for example, within the International Geosphere- Biosphere Programme (IGBP) the Integrated Land Ecosystem-Atmosphere Processes Study (ILEAPS) and the Surface Ocean-Lower Atmosphere Study (SOLAS);

(i) Link to the International Nitrogen Initiative and European initiatives on nitrogen in order to increase the scientific understanding of the use and release of reactive nitrogen and of measures to improve the management of nitrogen (European Science Foundation's (ESF) projects Nitrogen in Europe (NinE) and COST 729 as well as EU research projects);

(j) Links to WMO-GAW including its implementation of the IGACO strategy. Organize in partnership with WMO the capacity of EMEP in the EECCA countries and East Asia.

VI. STRUCTURE OF "STRATEGY FOR EMEP 2010-2019"

37. It is proposed to maintain to a large degree the structure of the current EMEP Strategy Plan 2000-2009, which consists of three main parts: I. Mandate of EMEP; II. Driving forces; and III. Strategy. The Strategy part is divided according to the EMEP vision and it is proposed to keep this structure with minor changes; the Strategy would therefore be divided into five main areas: A. Science, B. Partnership, C. Openness, D. Sharing and E. Organization.

38. The proposed main difference with respect to the structure of the current EMEP strategy relates to the science part. In the current strategy, this area is structured around the five main pollutant groups considered within EMEP, i.e. acidification and eutrophication; photochemical ozone formation; heavy metals; POPs; and fine particulate matter, plus one part with regional focus and an emphasis on integrated assessment modelling. The proposed new structure of the science part is divided into five priority thematic areas involving different pollutant groups.

39. In summary, the proposed structure of the EMEP 2010-2019 strategy is as follows:

I. Vision for EMEP

II. Mandate of EMEP

- A. Obligations of the Parties to the Convention

III. Driving Forces

- A. Past driving forces
B. Current driving forces
C. Need for a new strategy – what has been achieved from the previous strategy period

IV. Strategy for 2010-2019

- A. Science
 (a) Transboundary air pollution (C.1)
 (b) Air pollution changes as climate changes (C.2)
 (c) Air quality and its effect on populations (C.3)
 (i) Particulate matter (C.3.1)
 (ii) Toxic substances (C.3.2)
 (d) Atmospheric physical and biological processes (C.4)
 (i) Reactive nitrogen cycle (C.4.1)
 (ii) Air pollution and the carbon cycle (C.4.2)
 (e) Overall assessment and scenarios (C.5)
B. Partnership
C. Openness
D. Sharing
E. Organization

40. Each science topic (in section IV.A) is subdivided into four sections:

- (a) The main policy questions to be addressed;
- (b) Main methods and capacity-building needs;
- (i) Models including process descriptions and data assimilation;
- (ii) Emissions;
- (iii) Observations/monitoring;
- (iv) Overall assessment;
- (c) Main functions and products required;
- (d) Dissemination and outreach.

41. Several sections could have some subdivisions in common, for instance, those on observations/monitoring and on dissemination and outreach.

VII. QUESTIONS TO THE EMEP STEERING BODY

42. The Steering Body is invited to consider the proposals put forward by its Bureau and provide advice on further work. In particular it is invited to:

(a) Agree on the need to revise the EMEP strategy while retaining its vision and ensuring that the revised strategic plan takes into account the achievements under the current plan;

(b) Discuss, modify, supplement and prioritize as appropriate the list of policy issues and relevant driving forces in section II;

(c) Discuss, modify, supplement and prioritize as appropriate the list of scientific questions presented in section III;

(d) Recommend how best to interact with IPCC, the Stockholm Convention on POPs, the Reactive Nitrogen Initiative, GMES and other initiatives to deal with the political issues and driving forces listed in section II and the science issues in section III.
